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2 We claim:

3 1) a multiple beam RF device comprising:

4 a housing having a central Z axis, said housing  
5 enclosing a plurality of electron beam tunnels, each said  
6 beam tunnel having a conductive inner surface, and each  
7 said beam tunnel further comprising a sequence of drift  
8 tubes and drift tube gaps, said beam tunnels arranged about  
9 said central Z axis of said housing, and said housing  
10 including a plurality of apertures, one said aperture for  
11 each said electron beam tunnel;

12 a plurality of electron guns equal to said plurality  
13 of said electron beam tunnels, each said electron gun  
14 producing an electron beam passing uniquely through one of  
15 said electron beam tunnels;

16 a magnetic field applied to each said electron beam,  
17 said magnetic field having a variation of less than 5% over  
18 the extent of said electron beam tunnels;

19 each said electron gun having a cathode for the  
20 generation of electrons, an anode for the acceleration of  
21 said electrons, and a focus electrode for the focusing of  
22 said electron beams.

23

1        2) The RF device of claim 1 wherein said beam tunnels  
2 are arranged substantially parallel to said central Z axis.

3        3) The RF device of claim 2 wherein RF energy may be  
4 introduced in at least one of said drift tube gaps, and RF  
5 energy may be removed from at least one of other said drift  
6 tube gaps.

7        4) The RF device of claim 3 wherein said housing is  
8 made from iron.

9        5) The RF device of claim 1 wherein said magnetic  
10 field is sufficient to achieve confined electron flow.

11       6) The RF device of claim 1 wherein said magnetic  
12 field produces a confining force which exceeds the space  
13 charge forces in said electron beam.

14       7) The RF device of claim 6 where the magnitude of  
15 said magnetic field is at least 2 times greater than said  
16 magnetic field required to balance said space charge force.

17       8) a multiple beam RF device comprising:

18       a housing having a central Z axis and an R plane  
19 orthogonal to said Z axis, said housing enclosing a  
20 plurality of electron beam tunnels, each said beam tunnel  
21 having a conductive inner surface, and each said beam  
22 tunnel further comprising a sequence of drift tubes and  
23 drift tube gaps, said beam tunnels arranged in said housing  
24 and parallel to said central axis Z of said housing, said

1 drift tubes having a minimum separation distance from said  
2 central axis Z of a separation distance D;

3 a plurality of electron guns, each said electron gun  
4 producing an electron beam passing through one of said  
5 electron beam tunnels;

6 a magnetic field applied to each said electron beam,  
7 said magnetic field having a field variation of less than  
8 5% over the extent of said electron beam tunnels;

9 each said electron gun having a cathode for the  
10 generation of electrodes, an anode for the acceleration of  
11 said electrons, and a focus electrode for the focusing of  
12 said electron beams;

13 one or more magnetic field correctors.

14  
15 9) The RF device of claim 8 wherein said magnetic  
16 field corrector comprises a coil, and said extent of said  
17 coil is less than said separation distance D.

18 10) The RF device of claim 8 wherein said field  
19 corrector comprises a single coil and said extent of said  
20 coil is greater than said separation distance D.

21 11) The RF device of claim 8 wherein said field  
22 corrector comprises a first coil with an extent less than  
23 said separation distance D, and a second coil with an  
24 extent greater than said separation distance D.

1           12) The RF device of claim 8 wherein said field  
2 corrector comprises a coil of current-carrying wire which  
3 produces said correction field.

4           13) The RF device of claim 8 wherein said field  
5 corrector comprises a permanent magnet.

6           14) The RF device of claim 8 wherein said field  
7 corrector comprises non-magnetized iron.

8           15) The RF device of claim 9,10,11, or 12 wherein said  
9 coil comprises a coil of current-carrying wire which  
10 produces said correction field.

11           16) The RF device of claim 9, 10, 11, or 12 wherein  
12 said field corrector comprises a permanent magnet.

13           17) The RF device of claim 9, 10, 11, or 12, wherein  
14 said corrector comprises non-magnetized iron.

15           18) The RF device of claim 9, 10, 11, or 12, wherein  
16 at least one of said correction coils comprises a coil of  
17 current-carrying wire which produces said correction field.

18           19) The RF device of claim 9, 10, 11, or 12, wherein  
19 at least one of said correction coils comprises a permanent  
20 magnet.

21           20) The RF device of claim 9, 10, 11, or 12, wherein  
22 at least one of said correctors comprises non-magnetized  
23 iron.

1        21) The RF device of claim 8, wherein said field  
2        corrector is located on the main axis of said device, said  
3        field corrector has a near end in proximity to said housing  
4        and intersecting said central Z axis, and a far end  
5        opposite said near end, said field corrector comprising a  
6        radially symmetric magnetic cylinder, said field corrector  
7        having a radius which is smaller on said near end, and  
8        larger at any point near said far end.

9        22) The RF device of claim 21, said field corrector  
10       further including an electromagnetic coil on said smaller  
11       radius.

12       23) The RF device of claim 21 or 22, said field  
13       corrector further including field correcting cutouts around  
14       said plurality of electron guns.

15       24) The RF device of claim 8 wherein said field  
16       corrector provides a magnetic field such that equipotential  
17       flux lines formed by said magnetic field when modified by  
18       said field corrector are substantially parallel to said  
19       electron beam tunnels.

20       25) The RF device of claim 1 or 8 wherein said RF  
21       device is an oscillator.

22       26) The RF device of claim 1 or 8 wherein said RF  
23       device is an amplifier.